

Blue Ridge Associates, Inc.

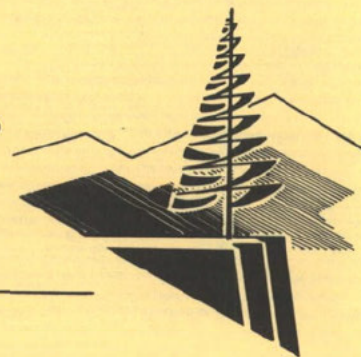
Geotechnical/Environmental Services

Jackie E. Stephens, President/Geologist
North 9 Post, Suite 250 - Spokane, WA 99201

Phone: (509) 838-8120

Fax: (509) 456-5956

Mobile: (509) 994-8171



14 May 1993

Robert Cutler
U. S. EPA, Region 10
WA Operations Office
c/o Washington DOE
P.O. Box 47600
Olympia, Washington 98504-7600

MAY 17 1993

EPA - WOO

RE: Site Characterization of the Coulee Express Mini Mart and Remediation Proposal

Dear Mr. Cutler:

Enclosed is a copy of the Site Characterization Report and Remediation Proposals. Please review the report at your earliest convenience and inform either myself or Mr. Jim D. Ray of your decision as to the remediation method we can utilize at the site.

Thank you for your cooperation and should you have any questions, please feel free to contact me at the above number.

Sincerely,

A handwritten signature in dark ink, appearing to read "Iain A. Olness". The signature is fluid and cursive, with the first name "Iain" being more prominent.

Iain A. Olness
Hydrogeologist

enc. as noted above

cc Matt Boyd, Environmental Health



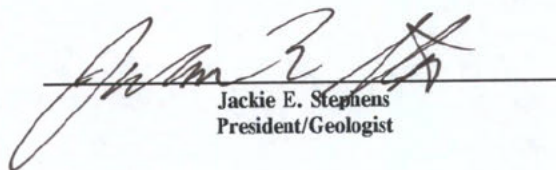
For: Jim D. Ray, Ray-Tozer Partnership

**SITE CHARACTERIZATION REPORT
AND
REMEDATION PROPOSAL**

COULEE EXPRESS MINI-MART

By: Iain A. Olness, Hydrogeologist

Reviewed by:



Jackie E. Stephens
President/Geologist

10 May 1993

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	SCOPE OF WORK	4
2.1	Site History	4
2.2	Review of Area and Location	4
2.3.1	Surrounding Properties	4
2.3.2	Geology and Hydrology	6
3.0	SITE CHARACTERIZATION	6
3.1	Site Description	6
3.2	Drilling Procedure	6
3.2.1	Monitoring Well Emplacement	8
3.3	Sampling Program	10
3.3.1	Description and Procedures	10
3.3.2	Results	11
3.3.3	Discussion	11
4.0	CONCLUSIONS AND RECOMMENDATIONS	13
5.0	LIMITATIONS	14
	APPENDICES	
I	Tightness Test Report for Tanks #1 through #4	
II	Bureau of Reclamation's Well Logs	
III	EPA Letter	
IV	Well Logs	
V	Laboratory Results	

PHOTOGRAPHS

Coulee Mini-Mart
Underground Storage Tank
Site Characterization

1.0 INTRODUCTION

Blue Ridge Associates, Inc. was retained by Jim D. Ray of Ray/Tozer Partnership to perform an Underground Storage Tank (UST) **Site Characterization** at the site described to this office as "Coulee Express Mini Mart", located at 200 Roosevelt Way, Coulee Dam, Washington (see Figure 1, Area Location; and Figure 2, Site Location). This report is being submitted to satisfy the scope of work of the consultant/client contract for an **UST Site Characterization**, and to meet the requirements of the U. S. Environmental Protection Agency (EPA) and the Colville Confederated Tribes.

A **SITE CHARACTERIZATION** consists of the information required for a **STATUS REPORT** plus the following:

- 1) A site conditions map indicating approximate boundaries of the property, all areas where hazardous substances are known or suspected to be located, and sampling locations. This map may consist of a sketch of the site at a scale sufficient to illustrate this information;
- 2) Available data regarding surrounding populations, surface and ground water quality, use and approximate location of wells potentially affected by the release, subsurface soil conditions, depth to groundwater, direction of groundwater flow, proximity to and potential for affecting surface water, locations of sewers and other potential conduits for vapor or free product migration, surrounding land use, and proximity to sensitive environments;
- 3) Results of tests of the free product investigation required under subsection (3)(a)(iii) and (iv) of WAC 173-340-450 of the Model Toxics Control Act.
- 4) Results of the free product investigation required under subsection (3)(a)(v) of WAC 173-340-450 of the Model Toxics Control Act.
- 5) Results of all completed site investigations, interim actions and cleanup actions and a description of any remaining investigations, cleanup actions and compliance monitoring which are planned or underway; and
- 6) Information on the free product removal efforts at sites where investigations indicate free product is present. This shall include, at a minimum, the following information:

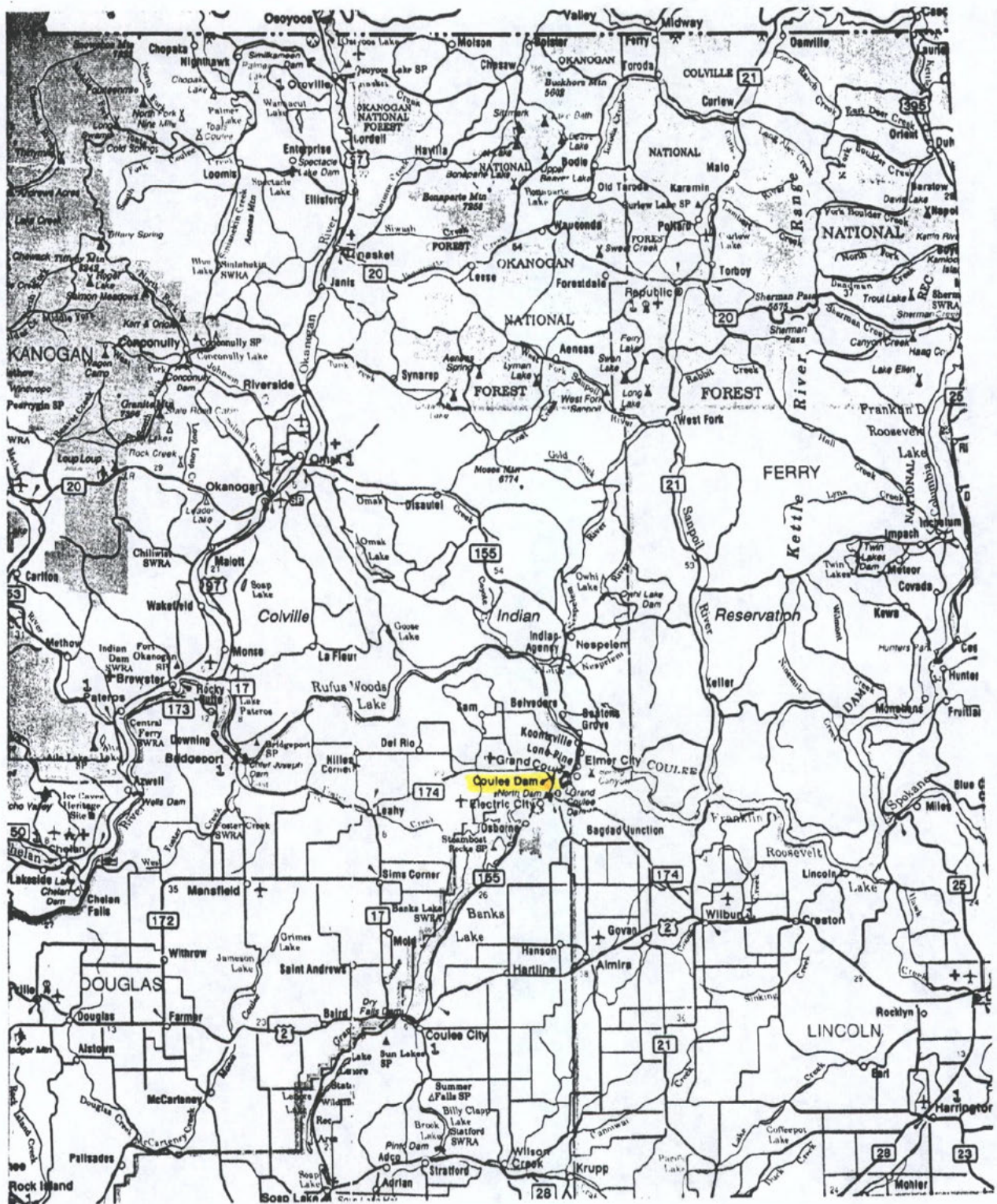


Figure 1: Area Location

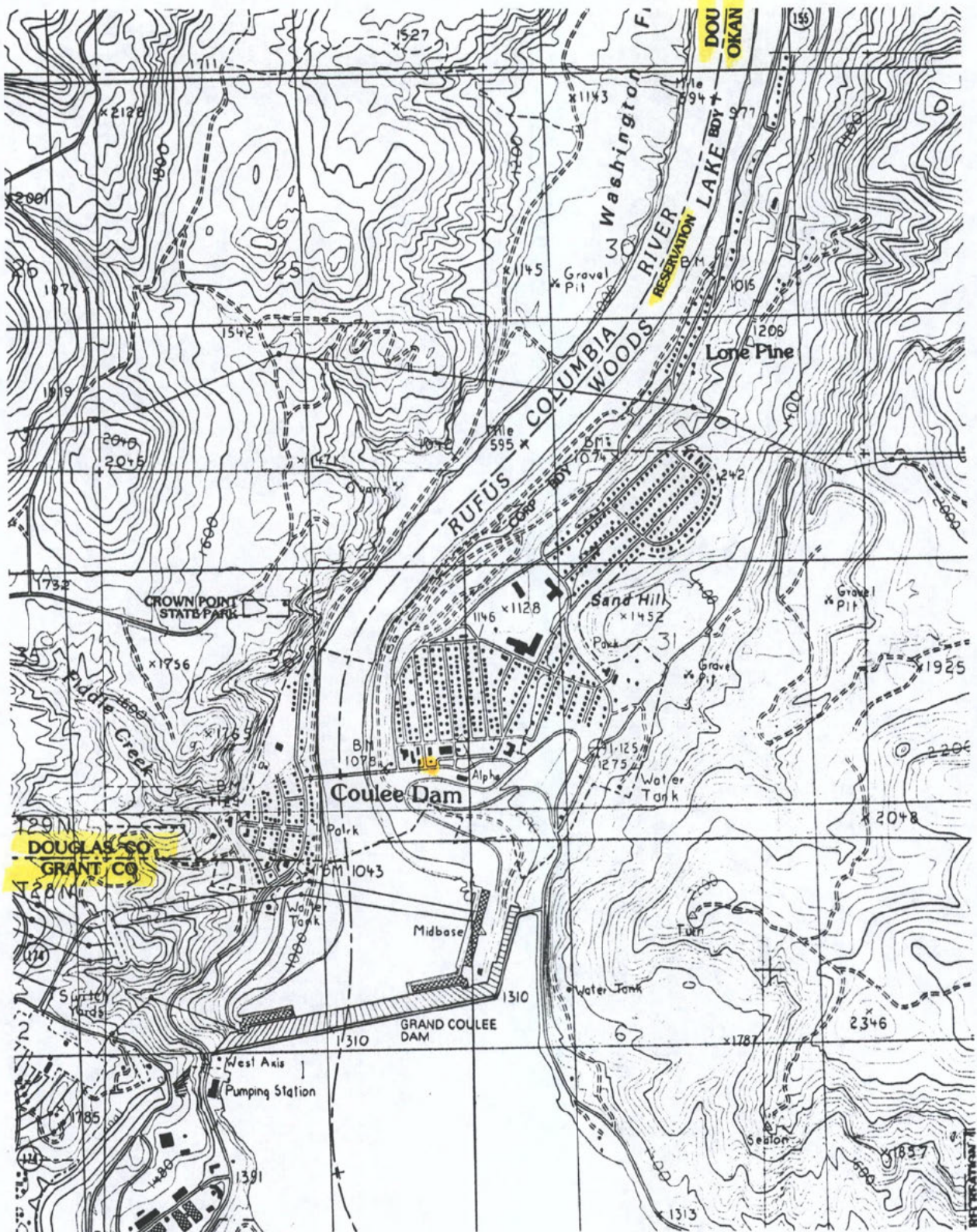


Figure 2: Site Location

- a) Name of person responsible for implementing the free product removal measures;
 - b) The estimated quantity, type, and thickness of free product observed or measured in wells, boreholes and excavations;
 - c) The type of free product recovery system used;
 - d) The location of any on-site or off-site discharge during the recovery operation;
 - e) The type of treatment applied to, and the effluent quality expected from, any discharge;
 - f) The steps taken and planned to obtain necessary permits for any discharge;
 - g) Disposition of recovered free product; and
- 7) Any other information required by the department.

2.0 SCOPE OF WORK

The scope of work performed for this characterization is intended to meet the EPA requirements for an **UST SITE CHARACTERIZATION**. The following discussion details the work performed during the course of this characterization.

2.1 Site History

The site has been a service station since at least 1965 and possibly earlier. The latest tightness test was conducted in March 1992 by Jensen Tank Testing (1340 Leland Road West, Quilcene, Washington 98376). The three gasoline tanks, diesel tank, and all associated piping were certified tight (see Appendix I).

2.2 Review of Area and Location

The site is located approximately one (1) mile down-river in a northerly direction from Grand Coulee Dam, within the city limits of Coulee Dam, Washington, approximately 900 feet from the eastern bank of the Columbia River. The City of Coulee Dam is located within the Colville Indian Reservation.

2.3.1 Surrounding Properties

The Coulee House Motel is located to the west, immediately across Birch Street. The motel is

comprised of three (3) separate buildings, with two restaurants occupying a portion of one of the buildings. The manager's office contains an electrical breaker box that was reported, by the (b) (6), to have emitted strong petroleum odors. (b) (6) first smelled gasoline odors (b) (6) Coulee House Motel office on Saturday, September 19, 1992. A summary sequence is as follows:

- 19 September 1992 (b) (6) started smelling gasoline in the main office and the basement.
- 20 September 1992 The gasoline odors became stronger.
- 21 September 1992 Gasoline odors were extremely strong. Norman Worsham and (b) (6) called Jimmy Ray. Product level in the tank was measured.
- 22 September 1992 (b) (6) called EPA (Robert Cutler), Colville Confederated Tribes (Matt Boyd) and DOE (Wayne Peterson). Wayne Peterson visited in the evening. Jim Ray measured the product level in tank #1 the next morning and the product was done three (3) inches
- 23 September 1992 Jimmy Ray called Jackie E. Stephens, Blue Ridge Associates, Inc.
- 24 September 1992 Blue Ridge Associates, Inc., made a proposal to work
- 25 September 1992 Jimmy Ray gave the go-ahead on the work proposal to Blue Ridge. Mr. Stephens scheduled excavators, tank cleaners and Blue Ridge supervisor for the following Tuesday.
- 29 September 1992 EPA Robert Cutler, Colville Indian Matt Boyd, Green Construction (Excavator), HSCI (Tank Cleaners), Bruce Christian of Blue Ridge, were on-site for the tank removal.
- 30 September 1992 Continued the tank removal, two extra tanks were found at one point, plus one additional tank was found a short time later.
- 1 October 1992 Tank removal continued.
- 2 October 1992 Completion of tank removal until approximately 7:30 P.M.

The breaker box is located 109 feet west (245° azimuth) and five (5) feet below ground level over the center of tank #1. The breaker box had been sealed with spray-foam insulation prior to Blue Ridge's arrival and no odors were detected, although 4 to 5 ppm volatiles could be read with the Photoionization Detector (PID).

To the east is the Good Deal Food and Variety Store and its associated parking lot. The land to the south is vacant, with the exception of a Bureau of Reclamation monitoring well (DH-207-

RS). To the north is a concrete building recently purchased by the Colville Confederated Tribes.

Sanitary and storm sewer lines run under Birch Street, which is west of the subject-property. A water main is also located under Birch, with a service branch and shutoff valve on the subject-property (see Figure 3, UST Excavation Plans). A single cable television cable and a single telephone line were inadvertently cut by Green Construction, Inc., during excavation of tank #6. The television cable serviced the subject-property, while the telephone line serviced a public phone booth located on the subject-property.

2.3.2 Geology and Hydrology

The subject-property is approximately 900 feet east of the Columbia River. The elevation of the subject property is approximately 1,130 feet above sea level and approximately 90 feet above the bank full stage of the Columbia River at this location.

The east wall of the excavation revealed fine sand to a depth of 6 feet, gravel and sand from 6 to 10 feet, brown clay from 10 to 14 feet, cobbles and gravel mixed with sand from 14 to 18 feet, and brownish clay from 18 to 21 feet. Boulders sized up to 5'x 5'x 3' were encountered in the gravel beds during excavation. The upper clay and gravel layers dropped approximately 4 feet from the east to the west wall, and there was a drop in elevation from the south wall to the north wall. This gave the geologic strata a dip towards the northwest.

Depth to groundwater is approximately 160 feet below the surface at the Bureau of Reclamations Riverbank Stabilization Investigation well #DH-207-RS, which is located approximately 150 feet to the south. The Bureau of Reclamation has a number of wells in the area (see Appendix II). Several are used to monitor specific geologic strata, and others are continuously pumped to help maintain soil stability in the area.

3.0 SITE CHARACTERIZATION

The following narrative discusses the findings of the **SITE ASSESSMENT**. Photographs of the site characterization are included in the appendices of this report.

3.1 Site Description

The excavation pit from the tank removal process had been re-filled with the contaminated soil from the original excavation. This was approved by Robert Cutler of the United States Environmental Protection Agency, Region 10 (see Appendix III). The site slopes gently to the west towards Birch Street.

3.2 Drilling Procedure

A Schramm T-64 Air Rotary Drill with an eight (8) inch tri-cone bit was used to drill the three (3) holes for installation of the monitoring wells. Two (2) of the holes were drilled on the site

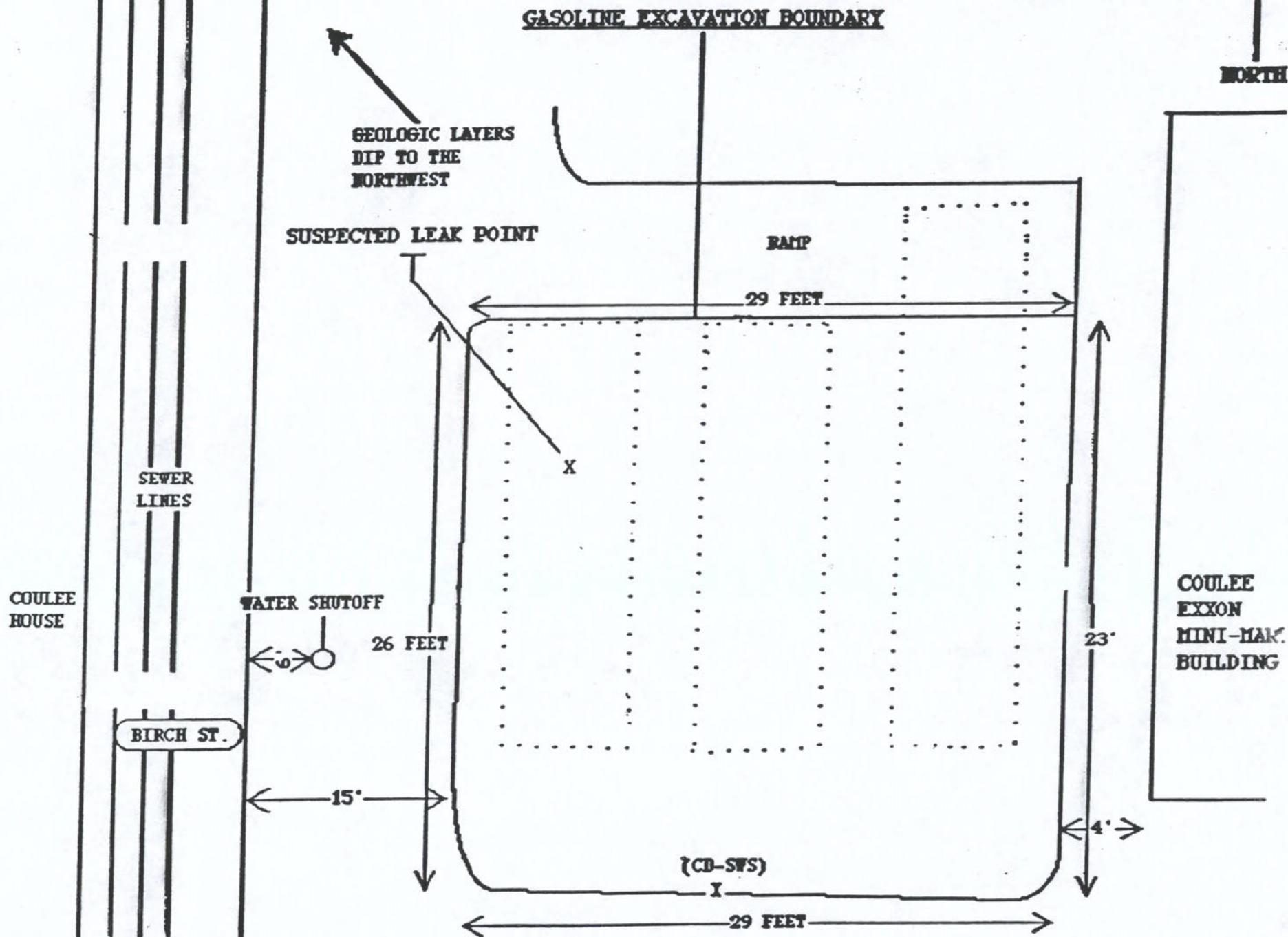


Figure 3: UST Excavation Plans

(MW-1 and MW-3) and the third hole was drilled across Birch Street near the Coulee House Motel (MW-2). Eight (8) inch casing was used to maintain an open hole while drilling as the material drilled through consisted of clay, sand, gravel, and cobbles. See Appendix IV for the well logs.

3.2.1 Monitoring Well Emplacement

Hole number one (Monitoring Well - One (MW-1)) is located in the pit approximately in the same location as the suspected leak point in tank number one, 22.3 feet from the southwest corner of the station and 31.3 feet from the northwest corner of the station (see Figure 4, Drilling Locations). This hole was drilled to a depth of fifty (50) feet and samples were taken at five (5) foot intervals starting at twenty (20) feet below ground surface (BGS). The samples were analyzed using a Photovac Microtip MP-1000 Photoionization Detector (PID). Drilling was stopped at fifty (50) feet BGS as no contamination was detected at this depth. A four (4) inch monitoring well was installed consisting of forty (40) feet of twenty (20)-slot screen, set from ten (10) to forty (40) feet BGS and ten (10) feet of blank PVC set from one half (.5) foot above ground surface to ten (10) feet BGS. Twenty two (22) one hundred (100) pound bags of Colorado Silica Sand (10-20 grade) were placed around the well from fifty (50) feet BGS to seven (7) feet BGS. Two (2) fifty (50) pound bags of bentonite chips (3/4 inch) were placed around the well from seven (7) feet BGS to approximately four (4) feet BGS. The well was not finished to the surface as the intent was to install an underground PVC pipe connecting the well to a vapor extraction system.

Hole number two was located across Birch Street, approximately five (5) feet from the sidewalk by the Coulee House Motel (see Photographs 5-8). The hole was drilled to a depth of thirty (30) feet and abandoned as no petroleum based contamination was detected using the PID. The well was abandoned according to State of Washington Department of Ecology Minimum Standards for Construction and Maintenance of Wells: Chapter 173-160-420 WAC, May 5, 1988. The hole was filled to the surface with twenty-four (24) fifty (50) pound bags of bentonite.

Hole number three (Monitoring Well - Two (MW-2)) is located 35.3 feet northwest of MW-1 and 45.3 feet southwest of the northwest corner of the station (see Figure 4). This hole was drilled to a depth of fifty (50) feet and samples were taken at five (5) foot intervals starting at five (5) feet below ground surface (BGS). The samples were analyzed using a Photovac Microtip MP-1000 Photoionization Detector (PID). Drilling was stopped at fifty (50) feet BGS as no contamination was detected in any of the samples. A four (4) inch monitoring well was installed consisting of forty (40) feet of twenty (20)-slot screen, set from ten (10) to forty (40) feet BGS and ten (10) feet of blank PVC set from one half (.5) foot above ground surface to ten (10) feet BGS. Twenty two (22) one hundred (100) pound bags of Colorado Silica Sand (10-20 grade) were placed around the well from fifty (50) feet BGS to seven (7) feet BGS. Four (4) fifty (50) pound bags of bentonite chips (3/4 inch) were placed around the well from seven (7) feet BGS to approximately four (4) feet BGS. The well was not finished to the surface as the intent was to install an underground PVC pipe connecting the well to a vapor extraction system.

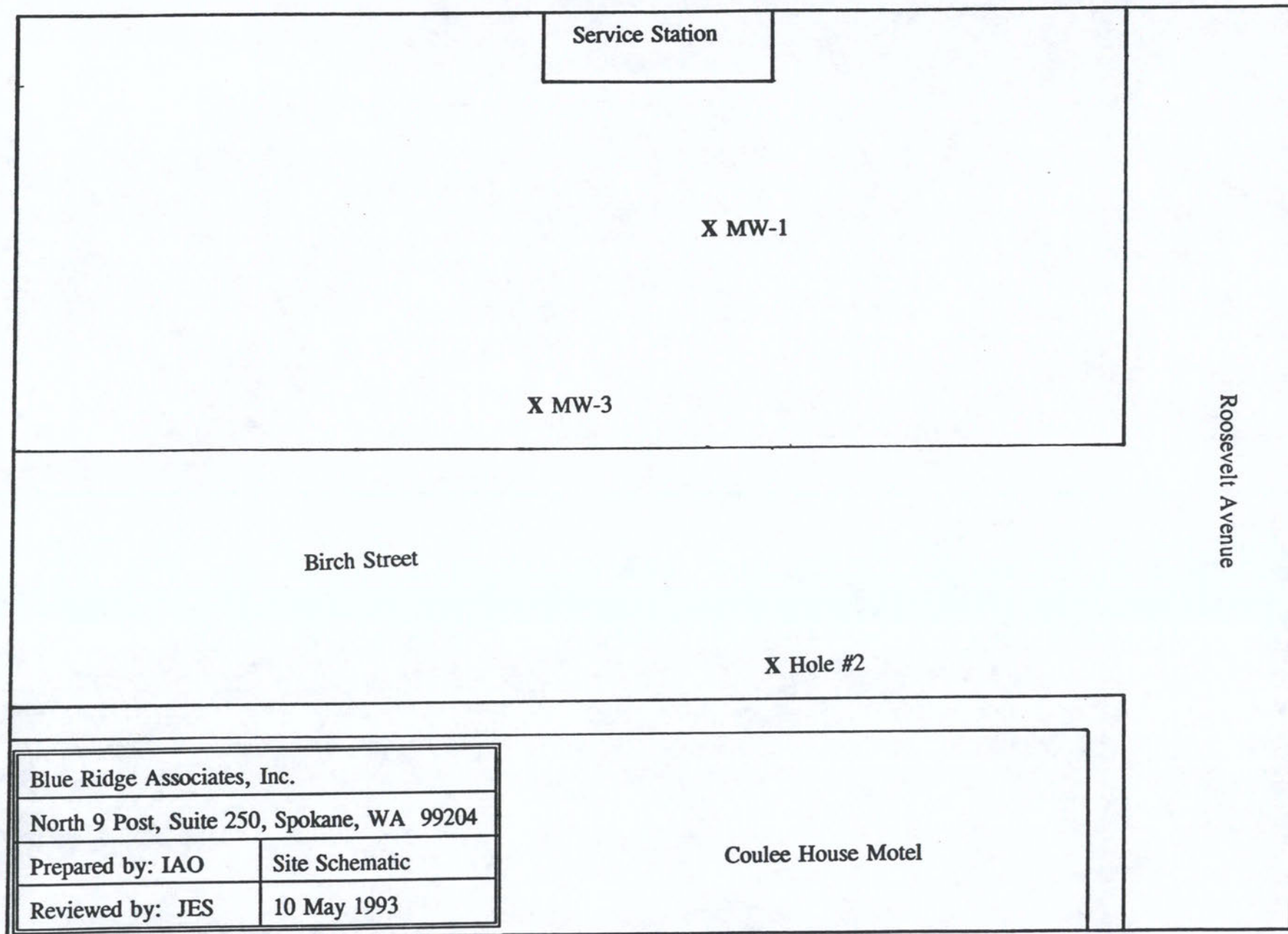


Figure 4: Drilling Locations

3.3 Sampling Program

Samples were collected according to State of Washington Department of Ecology Regulations and to meet the requirements of the U. S. Environmental Protection Agency (EPA) and the Colville Confederated Tribes.

3.3.1 Description and Procedures

Number of Samples: Twenty-three (23).

Hole Number One - seven (7)

Hole Number Two - six (6)

Hole Number Three - ten (10)

Location of Samples:

Samples were taken at intervals of five (5) feet in all drill holes beginning at:

(a) twenty (20) feet BGS in Hole Number One

(b) five (5) feet BGS in Hole Number Two

(c) five (5) feet BGS in Hole Number Three

Type of Samples: Soil. All samples consisted of sand and/or gravel.

Method of Collection: Samples were collected from the discharge hose of the drill. Split spoon samples were attempted, however, split spoon refusal due to the abundance of gravels and cobbles. Gloves were worn in order to avoid contamination of the individual samples.

Method of Preservation: The twenty-three (23) samples were immediately placed in 200 ml. borosilicate jars and sealed with their teflon-lined lids. They were placed in a cooler, and ice was added to cool and maintain the samples at approximately 4° centigrade. The samples were then shipped via Greyhound Bus, accompanied by a signed "Chain of Custody" form in accordance with EPA/DOE guidelines to Anatek Labs in Moscow, Idaho.

Analytical laboratory:

Anatek Labs.
1917 S. Main
Moscow, ID 83843
(208)-883-2839

Microtip Photoionization Detector (PID): A PID was also used during the site characterization. The PID was used to help determine the extent of soil contamination during the drilling process. 66

3.3.2 Results

Samples were analyzed for the following:

- 1) Total Petroleum Hydrocarbons (TPH-Gasoline)
- 2) BTEX (Benzene-Toluene-Ethylbenzene-Xylene)
- 3) Total Lead

EPA analysis methods are as follows:

- 1) TPH-G - EPA 8015 modified
- 2) BTEX - EPA 8020 modified
- 3) Total lead - RCRA 3050

A copy of the lab report has been included in the appendices.
The analysis results are listed in Table 1 and are given in mg/kg (ppm).

3.3.3 Discussion

Three samples (IAO-CDMW1-22BGS through IAO-CDMW1-30BGS) from hole number one (1) had TPH-G levels above the soil action levels set by the Washington State DOE. All three (3) samples were below the action levels for benzene, toluene, ethylbenzene, and xylene (BTEX) set by the DOE. The soil action levels for petroleum releases set by the DOE are listed in Table 2. The other seven (7) samples were below the action levels for TPH-G and BTEX set by the DOE. Samples taken from hole number two (2) and hole number (3) were all below action levels for TPH-G and BTEX. Appendix V is a copy of the laboratory report. 111

The location of hole number one was chosen as it was approximately in the same area as the suspected leak point (see Figure 4). Drilling of this hole was stopped at fifty feet as sample readings obtained with the PID indicated that petroleum levels were dropping from thirty-five (35) feet BGS and at fifty (50) feet BGS no petroleum contamination was indicated when analyzing the sample with the PID.

Drilling of hole number two was stopped at thirty feet as no contamination was detected in any of the samples. The hole was located across Birch Street, approximately five (5) feet from the sidewalk by the Coulee House Motel (see Figure 4; and Photographs 5-8). This location was chosen as (b) (6) of the Coulee House Motel had reported a strong petroleum odor in his basement office. As no contamination was detected in any of the six (6) samples it is believed that petroleum vapors traveled along the water line from the Mini Mart to the water main located in the center of Birch Street and then along the water line to the Coulee House Motel. (b) (6) stated that the petroleum odor disappeared once the tanks had been cleaned and removed.

concentrations
mg/kg (ppm) - see P.11

Table 1: Analytical Results

Sample Number	TPH-G ¹	Benzene	Toluene	Ethylbenzene	Xylene	Lead
IAO-CDMW1-22BGS	(321¹)	<0.001	<0.005	0.294	0.246	16.2
IAO-CDMW1-25BGS	(378)	<0.001	<0.005	0.156	0.149	9.9
IAO-CDMW1-30BGS	(114)	<0.001	<0.005	0.011	<0.015	6.4
IAO-CDMW1-35BS	76	<0.001	<0.005	0.048	0.026	2.1
IAO-CDMW1-40BGS	9.3	<0.001	<0.005	0.007	<0.015	2.0
IAO-CDMW1-45BGS	6.7	<0.001	<0.005	0.009	<0.015	4.0
IAO-CDMW1-50BGS	<1.0	<0.001	<0.005	0.007	<0.015	10.9
IAO-CDMW2-5BGS	<1.0	<0.001	<0.005	0.010	<0.015	2.8
IAO-CDMW2-10BGS	<1.0	<0.001	<0.005	0.006	<0.015	6.4
IAO-CDMW2-15BGS	<1.0	<0.001	<0.005	0.006	<0.015	1.1
IAO-CDMW2-20BGS	<1.0	<0.001	<0.005	0.066	0.038	2.2
IAO-CDMW2-25BGS	<1.0	<0.001	<0.005	0.005	<0.015	5.1
IAO-CDMW2-30BGS	<1.0	<0.001	<0.005	0.005	<0.015	5.6
IAO-CDMW3-5BGS	<1.0	<0.001	<0.005	<0.005	<0.015	1.6
IAO-CDMW3-10BGS	<1.0	<0.001	<0.005	<0.005	<0.015	5.0
IAO-CDMW3-15BGS	<1.0	<0.001	<0.005	<0.005	<0.015	1.4
IAO-CDMW3-20BGS	<1.0	<0.001	<0.005	<0.005	<0.015	2.3
IAO-CDMW3-25BGS	<1.0	<0.001	<0.005	<0.005	<0.015	7.8
IAO-CDMW3-30BGS	<1.0	<0.001	<0.005	<0.005	<0.015	2.3
IAO-CDMW3-35BGS	<1.0	<0.001	<0.005	<0.005	<0.015	4.5
IAO-CDMW3-40BGS	<1.0	<0.001	<0.005	<0.005	<0.015	3.3
IAO-CDMW3-45BGS	<1.0	<0.001	<0.005	<0.005	<0.015	9.4
IAO-CDMW3-50BGS	<1.0	<0.001	<0.005	<0.005	<0.015	5.7

¹ Analyzed for Total Petroleum Hydrocarbon - Gasoline

² Results in bold and brackets are above DOE Action Levels

The location of hole number three was chosen as it was down-dip from the suspected leak point (see Figure 4). Although no petroleum contamination was detected in any of the ten (10) samples obtained from this hole, drilling continued to a depth of fifty (50) feet in order to install a monitoring well to be used for later remediation.

Table 2: Soil Action Levels set by the Washington Department of Ecology ✓

Analyte	Action Levels
Benzene	0.5 mg/Kg
Ethylbenzene	20.0 mg/Kg
Toluene	40.0 mg/Kg
Xylene	20.0 mg/Kg
TPH-G	100.00 mg/Kg
Lead	250.0 mg/Kg

4.0 CONCLUSIONS AND RECOMMENDATIONS

The sample results indicate that any petroleum release which occurred migrated downwards. This is consistent with the type of material, mostly sands and gravels, drilled through. It is hypothesized that the contamination migrated down through the sands, gravels, and cobbles until it came into contact with a less permeable unit, such as a clay. Once the petroleum contamination came into contact with a clay layer, it could either adsorb to the clay or follow the clay layer down dip. Well logs for wells in the surrounding area from the Bureau of Reclamation were obtained and reviewed. These logs indicate that there are several clay layers at varying depths in the area, however, these clay layers are not indicated in all logs. No clay was found in any of the holes drilled for the placement of the monitoring wells, with the exception of the clay set in the bottom of the excavation pit. The clay was placed in the excavation pit on top of ten (10) mil plastic to minimize the possibility of rain or snowmelt from further transporting the petroleum contamination downwards.

A major concern associated with any contamination release is the possibility of the contaminant impacting groundwater/surface water. Permission was granted by the Bureau of Reclamation to sample several wells located down gradient of the suspected leak point. All the samples indicated no petroleum contamination.

1) Method A:

Two (2) four (4) inch monitoring wells were installed within the confines of the subject-property. The first well, monitoring well - one (MW-1), is located in the excavation pit in approximately the same location as the suspected leak point. The second well, monitoring well - three (MW-3), is located 35.3 feet northwest of MW-1, down-dip.

These wells were installed with the intention of designing a vapor extraction system to remediate the site. The design would consist of three (3) air injection wells and one (1) vapor extraction well, MW-1. MW-3 would be one of the air injection wells, and two more wells would be installed (see Figure 5, Vapor Extraction Remediation System: Well Layout).

2) Method B:

A second, more cost efficient method to contain the contamination would be to pave the area from where the tanks were removed. This would prevent the infiltration of water or snow melt, and in turn, the contamination would be prevented from migrating downwards. This method would not clean the contaminated soil, however, with the low contamination levels, would be a legitimate method of protection.

In conclusion, the site characterization study indicates that the petroleum contamination migrated rapidly downwards through the sand, gravel, and cobbles until such time that it contacted a clay layer. Contamination levels are relatively low, as indicated by the laboratory results and probably do not pose a significant health hazard. As the contamination levels are relatively low, it is proposed that the area from which the tanks were removed be covered with asphalt. This would prevent the further downward migration of petroleum contamination by rain or snow melt.

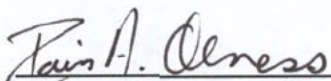
5.0 LIMITATIONS

This report is for the exclusive use of Mr. Jim D. Ray, of Ray-Tozzer Partnership, to assist in the evaluation of potential environmental liability associated with UST's formerly located on the subject-property.

All work has been performed in accordance with the guidelines of the United States Environmental Protection Agency and of the Colville Indian Tribe. No other warranty, expressed or implied, is made.

The conclusions in this report are based on existing conditions, observations, and data made available by the owner and by governmental agencies. Blue Ridge Associates, Inc. accepts no liability for lack of accuracy in data obtained from governmental agencies. Any representation regarding future generation, storage, handling, or use of hazardous materials, substances, or wastes on the subject-property is outside the scope of this UST Site Characterization.

Field/Office investigations and report completed by:


Iain A. Olness
Hydrogeologist

10 May 1993
(date)

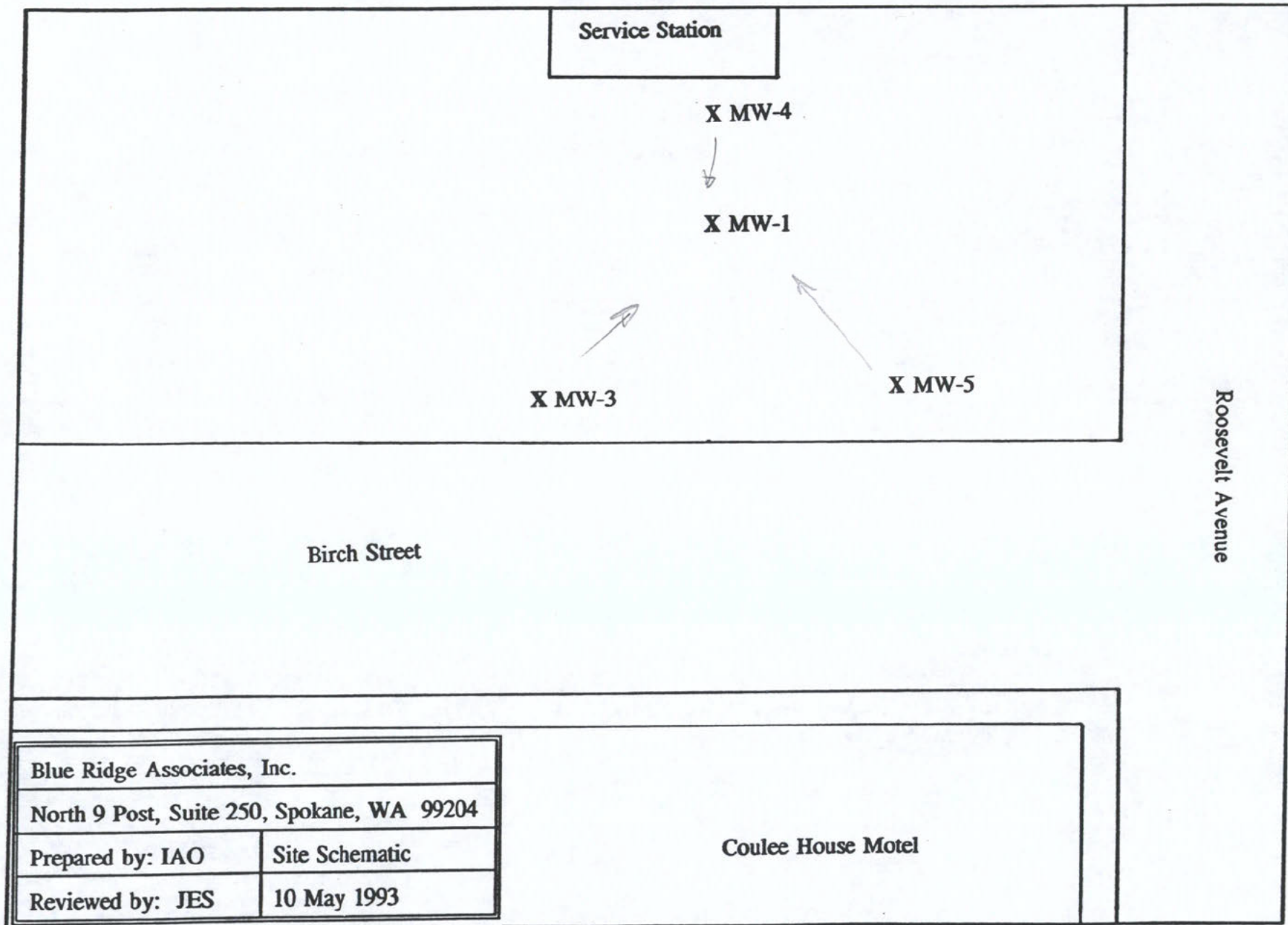


Figure 5: Vapor Extraction Remediation: Well Layout

APPENDIX I

**TIGHTNESS TEST REPORT
FOR TANKS #1 THROUGH #4**

UNDERGROUND STORAGE TANK DATA SHEET

TANK(S) LOCATION:

COULEE DAM EXPRESS
COULEE DAM, WA 99116
206/457-6350
DOE SITE #: 009272

TANK TESTING COMPANY:

JENSEN TANK TESTING
1340 LELAND ROAD WEST
QUILCENE, WA 98376
206/765-3331

TANK ID# 1 3000 GALLON UNLEADED

Testing Date> March 16, 1992
Tank Test Result> +.023 GPH
Line Test Result> -0- GPH
Line Leak Detector Test> Passed

TANK ID# 2 3000 GALLON UNLEADED

Testing Date> March 16, 1992
Tank Test Result> +.023 GPH
Line Test Result> -0- GPH
Line Leak Detector Test> Passed

TANK ID# 3 4000 GALLON REGULAR


Testing Date> March 16, 1992
Tank Test Result> +.017 GPH
Line Test Result> -.002 GPH
Line Leak Detector Test> Passed

TANK ID# 4 1000 GALLON DIESEL

Testing Date> March 16, 1992
Tank/Line Test Result> +.015 GPH

APPENDIX II

BUREAU OF RECLAMATION'S WELL LOGS

		EXPLANATION			
 CORE LOSS CORE RECOVERY	RB = Rock Bit				
	CCB = Clay Coring Bit				
	WS = Wash Sample				
	T = Temporary				
	Type of hole	D = Diamond, H = Haystack, S = Shot, C = Churn			
Hole sealed	P = Packer, Cm = Cemented, Cs = Bottom of casing				
Approx. size of hole (X-series) . . .	Ex = 1-1/2", Ax = 1-7/8", Bx = 2-3/8", Nx = 3"				
Approx. size of core (X-series) . . .	Ex = 7/8", Ax = 1-1/8", Bx = 1-5/8", Nx = 2-1/8"				
Outside dia. of casing (X-series) . . .	Ex = 1-13/16", Ax = 2-1/4", Bx = 2-7/8", Nx = 3-1/2"				
Inside dia. of casing (X-series) . . .	Ex = 1-1/2", Ax = 1-29/32", Bx = 2-3/8", Nx = 3"				

FEATURE RIVERBANK STABILIZATION INVESTIGATION PROJECT... GRAND COULEE... STATE... WASHINGTON
HOLE NO. 207-RS... LOCATION Coulee Dam East... DECK ELEV. 1131.1... DIP (ANGLE FROM HORIZ.)... VERTICAL...
COORDS. A 39+51.38... B + (11+77.63) TOTAL DEPTH 266.6... BEARING...
BEGUN 4-22-76... FINISHED 5-11-76... DEPTH OF OVERBURDEN 256.1...
DEPTH AND ELEV. OF WATER LEVEL AND DATE MEASURED... SEP. 1976... LOGGED BY... G. Brown... LOG REVIEWED BY... J. S. Bartell

NOTES ON WATER LOSSES AND LEVELS, CASING, CEMENTING, CAVING, AND OTHER DRILLING CONDITIONS	TYPE AND SIZE OF HOLE	CORE RECOVERY (%)	PERCOLATION TESTS					ELEVATION (FEET)	DEPTH (FEET)	GRAPHIC LOG	SAMPLES FOR TESTING	CLASSIFICATION AND PHYSICAL CONDITION
			DEPTH (FEET)		LOSS (G.P.M.)	PRESSURE (P.S.I.)	LENGTH OF TEST (MIN.)					
			FROM (P.C. or Cm)	TO								
CHARACTER OF DRILLING 0.0-90.0 drove casing as hole advanced to reduce drill fluid loss and daving. Cored 80.4-256.1, drilled with rock bit through gravel and cobble zones. 90.0-256.1 reamed hole with 7-7/8" rockbit. Cored 256.8-266.6, could not locate N hole for final core run.	7 7/8" RB			Sand and Gravel				1031.1	100.0			96.0-126.2: <u>COBBLES</u> , <u>GRAVEL</u> , and <u>SAND</u> ; reported by drillers; recovered a little coarse sand, pea gravel, and silt; also recovered basaltic chips to 1/4".
	10" WS			Select Sand								126.2-132.0: <u>SILTY SAND</u> ; 50-100% fine to coarse sand, 0-5% nonplastic fines; strong HCl reaction; firm; moist; tan; (SM).
	20" 7 7/8" RB			Piezometer #4 Wellpoint				1009.1	122.0			132.0-135.5: <u>FAT CLAY</u> and <u>LEAN CLAY</u> ; highly sheared, brecciated with no bedding noted; moderate HCl reaction; tan; (CH-CL).
	30" 5 1/2" CCB	100		Bentonite				1004.9	126.7			135.5-195.5: <u>SAND</u> and <u>SANDY SILT</u> ; mostly ranges from fine to medium sand; about 60-75% fine to medium sand, traces of coarse sand, 30% sandy silt with more than 50% nonplastic fines; most sand ranges from 5-30% fines; orange iron stain, darker on coarse sand layers, weak lamination; very strong HCl reaction; fairly firm to dense; brown and tan to gray (SP-SM).
REASON FOR TERMINATION Determination of granite bedrock.	40" 100	100		Cement				999.1	132.0			162.5-164.0: <u>Sandy Silt</u> ; unsorted; dense, till-like; no bedding; strong HCl reaction; tan.
	50" 100	100		Sand and Gravel				995.6	135.5			194.1-195.5: <u>Gravel</u> ; reported by drillers.
COMPLETION OF HOLE Removed 6", 8", and 10" casing. Installed isolated piezometers at 122.0, 188.5, 234.0, and 256.5. Cemented 4" casing wellhead into hole. Blew out piezometers and disinfected with 50% hyamine solution diluted in 5cc/5gal water.	60" 100	100										195.5-256.1: <u>VARVED FAT CLAY</u> , <u>LEAN CLAY</u> , and <u>SILT</u> with sand, silt, and clay interbeds (Nespelem fm.); generally consists of 25-50% fat clay varves, 25-50% silt varves, and about 25% lean clay varves; varves and laminae are relatively undisturbed and horizontal with a little horizontal shearing present; varies from firm to soft with very few soft layers; has a few saturated layers but most is moist to damp; HCl reaction is weak to moderate on silt varves, moderate to strong on silt, sand, and clay interbeds; greenish brown to tan clay; greenish gray to white silt, gray to brown sand (CH, CL, ML varved clay), (CH, CL clay), (ML and SM silts and sands).
WATER LEVEL DATA AFTER INSTALLATION OF PIEZOMETERS Date: 5-17-76	70" 100	100		Select Sand								
Depth to Water (feet)	80" 100	100										
Piez. #1 166.4	90" 100	100		Piezometer #3 5' slotted PVC				942.6	188.5			
#2 144.7	100	100										
#3 168.4	100	100										
#4 108.2	100	100										
SAMPLES SENT TO E&R CENTER IN DENVER FOR TESTING	100	100										
132.5-133.0	100	100										
133.0-133.5	100	100										
200.0-200.4	100	100										
203.85-204.3	100	100										
211.8-212.4	100	100										
220.6-221.1	100	100										
224.5-225.0	100	100										
226.1-227.1	100	100										
231.6-232.1	100	100										
248.9-249.4	100	100										
253.3-259.8	100	100										
254.4-254.9	100	100										
	</											

RB = Rock Bit
CCB = Clay Coring Bit
WS = Wash Sample
() Core recovery greater than 100%

EXPLANATION

FEATURE . RIVERBANK STABILIZATION INVESTIGATION PROJECT GRAND COULEE STATE WASHINGTON
LOCATION . Coulee Dam East
HOLE NO. 207-RS COORDS. N 39° 51' 38" E 111° 77' 69" DECK ELEV. 1131.1 DIP (ANGLE FROM HORIZ.) VERTICAL
BEGUN . 4-22-76 . FINISHED . 5-11-76 DEPTH OF OVERBURDEN . 256.1 TOTAL DEPTH . 266.6 BEARING
DEPTH AND ELEV. OF WATER See Notes LOGGED BY G. Brown LOG REVIEWED BY J. S. Bartell

NOTES ON WATER LOSSES AND LEVELS, CASING, CEMENTING, CAVING, AND OTHER DRILLING CONDITIONS	TYPE AND SIZE OF HOLE	CORE RECOVERY (%)	PERCOLATION TESTS				ELEVATION (FEET)	DEPTH (FEET)	GRAPHIC LOG	SAMPLES FOR TESTING	CLASSIFICATION AND PHYSICAL CONDITION	
			DEPTH (FEET)		LOSS (G.P.M.)	PRESSURE (P.S.I.)						LENGTH OF TEST (MIN.)
			FROM (P, Cs, or Cn)	TO								
	5 1/2" CCB			Cement			931.1	200.0			195.5-256.1: (Continued from Page 2) 195.5-199.5: No recovery. 199.5-199.8: Cobble; 4" diameter; possibly fell in from above. 205.6-206.0: Mushy recovery. 230.0-231.0: Very soft; saturated. 236.9-241.0: No recovery; probably washed out. 241.0-243.0: Silty Sand and Silt with Clay shear; 50% nonplastic fines; 50% fine sand, traces of clay; gray to greenish gray.	
		100		Select Sand								
		10										
		100										
		20										
		70		Piezometer #2								
		100		10' Slotted PVC			897.1	234.0				
		40		Bentonite								
		60		Cement								
		100										
	5 1/2" CCB			Piezometer #1			875.0	256.1			256.1-266.6: GRANITE (G-1); very coarse grained, nearly a pegmatite; very high quartz and feldspar content; thin chloritic seams on joints, otherwise unaltered; hard; breaks from moderate to hard hammer blow; thin calcite coatings on joints; lightly to highly jointed; 100% recovery; orange to pinkish white. 256.1-261.5 Most core over 0.5' long, one 1.7' length; one vertical joint 256.1-257.3; 4 joints dip 0-15°, and 2 are vertical; recovered as 100% core. 261.5-266.6: 50% fragments less than 0.4' long; vertical joints in 50% of core; 10 joints dip 0-20°, 6 dip 40-50°, and 4 in 2 sets dip 55-65° with a few adjacent, healed joints also in the joint set.	
	7 7/8" R.B.			5' Slotted PVC			874.6	256.6				
	NxD			Select Sand								
		100					864.5	266.6				
		60										
		70										
		80										
		90										
WATER LEVEL DATA												
Measured depth to drill fluid at end of swing and beginning of day shift.												
Date of hole of Cs To Fluid Type												
1976												
4/23-24 19.5 0 0.0 2.0 Be												
4/26-27 29.0 19.6 0.0 0.0 Be												
4/27-28 39.1 27.6 0.0 4.2 Be												
4/28-29 53.9 34.9 0.0 0.2 Be												
4/29-30 71.3 34.9 0.0 4.7 Be												
5/01-03 162.5 90.0 0.0 24.1 Re												
5/05-06 266.6 256.7 0.0 9.8 Cl												

CORE LOSS	CORE RECOVERY	EXPLANATION	
		Re = Revert	Cl = Clear Water
		RB = Rock Bit	
		CCB = Clay Coring Bit	
		WS = Wash Sample	
		Be = Bentonite	
Type of hole D = Diamond, H = Haysellite, S = Shot, C = Churn			
Hole sealed P = Packer, Cn = Cemented, Cs = Bottom of casing			
Approx. size of hole (X-series) Ex = 1-1/2", Ax = 1-7/8", Bx = 2-3/8", Nx = 3"			
Approx. size of core (X-series) Ex = 7/8", Ax = 1-1/8", Bx = 1-5/8", Nx = 2-1/8"			
Outside dia. of casing (X-series) Ex = 1-13/16", Ax = 2-1/4", Bx = 2-7/8", Nx = 3-1/2"			
Inside dia. of casing (X-series) Ex = 1-1/2", Ax = 1-29/32", Bx = 2-3/8", Nx = 3"			

FEATURE	THIRD POWERPLANT EXTENSION	PROJECT	GRAND COULEE	STATE	WASHINGTON
HOLE NO.	DH-425	LOCATION	TAILRACE	ELEV.	1089.2'
BEGUN	See Notes	COORDS.	A 34+60.9 B - (10+82.1)	DIP (ANGLE FROM HORIZ.)	VERTICAL
FINISHED	See Notes	DEPTH TO BEDROCK	210.5'	TOTAL DEPTH	249.5'
DEPTH AND ELEV. OF WATER LEVEL AND DATE MEASURED	See Notes	LOGGED BY	P. J. Hansen	LOG REVIEWED BY	J. S. Bertell

[illegible]

w/ = With
 @ = At
 BS = Bailer sample
 WS = Wash sample

Type of hole D = Diamond, H = Haystellite, S = Shot, C = Churn, RB = Rockbit
 Hole sealed P = Packer, Cm = Cemented, Cs = Bottom of casing
 Approx. size of hole (X-series) . . Ex = 1-1/2", Ax = 1-7/8", Bx = 2-3/8", Nx = 3"
 Approx. size of core (X-series) . . Ex = 7/8", Ax = 1-1/8", Bx = 1-5/8", Nx = 2-1/8"
 Outside dia. of casing (X-series) . Ex = 1-13/16", Ax = 2-1/4", Bx = 2-7/8", Nx = 3-1/2"
 Inside dia. of casing (X-series) . Ex = 1-1/2", Ax = 1-29/32", Bx = 2-3/8", Nx = 3"

FEATURE .THIRD .POWERPLANT .EXTENSION PROJECT .GRAND .COULEE . STATE .WASHINGTON SHEET .2 . OF .3 . . HOLE NO .DH-425
 ☆GPO 678 062

FEATURE... THIRD POWERPLANT EXTENSION... PROJECT... GRAND COULEE... STATE... WASHINGTON...
 HOLE NO. DH-425... LOCATION... TAILRACE... COORDS. A 34+60.9... B -(10+82.1) DECK ELEV. 1089.2'... DIP (ANGLE FROM HORIZ.)... VERTICAL...
 BEGUN (Sheet 1)... FINISHED (Sheet 1)... DEPTH TO BEDROCK... 210.5'... TOTAL DEPTH... 249.5'... BEARING... ---
 DEPTH AND ELEV. OF WATER LEVEL AND DATE MEASURED... See Notes... LOGGED BY... P. J. Hansen... LOG REVIEWED BY... J. S. Bartell

NOTES ON WATER LOSSES AND LEVELS, CASING, CEMENTING, CAVING, AND OTHER DRILLING CONDITIONS	TYPE AND SIZE OF HOLE	CORE RECOVERY (%)	PERCOLATION TESTS				ELEVATION (FEET)	DEPTH (FEET)	GRAPHIC LOG	SAMPLES FOR TESTING	CLASSIFICATION AND PHYSICAL CONDITION	
			DEPTH (FEET)		LOSS (G.P.M.)	PRESSURE (P.S.I.)						LENGTH OF TEST (MIN.)
			FROM (P. C. or Cm)	TO								
HOLE COMPLETION 0-150.0': Permanent 10" CS was installed by Holman Drilling Corporation. 150.0-249.5': Installed piezometers while pulling 4" CS; pulled 4" and 6" CS; blow piezometer tubes dry. Piezometer #2 moved when pulling CS; partially filled w/ cement; readings may, in part, be invalid. Piezometers #1 and #3 are o.k. REASON FOR TERMINATION Reached required depth.	5" H	100	Piezometer #2								186.5-210.5': (Nespelem Formation); <u>LEAN</u> to <u>FAT CLAY</u> with minor <u>SILT</u> . About 95% variably medium or highly plastic fines; 5% fine sand. Massive to thickly bedded, with interval of laminated (varved) clay and silt as noted below. <u>Silt</u> , is confined to laminated (varved) interval. Firm, 4" core can be deeply gouged to cut with moderate to strong knife pressure. No to locally strong reaction to HCl. Damp. Dark gray and brown with streaks and spots of buff to white calcium carbonate. (CL-CH w/ML) 170.2' and 197.8'; <u>Slip Planes</u> ; slickensided; dip 25°. 200.2-210.5': <u>Thinly Bedded to Laminated (Varved)</u> . Paper thin to 1/8" thick <u>silt</u> partings are spaced at 1/4-1-1/2" intervals. Horizontal from 200.2-205.2; dips 2-5° from 205.2-210.5'. 210.5-249.5: <u>GRANITE</u> (G ₂); fine to medium grained. Lightly weathered to fresh, body of rock is fresh and gray, joints are lightly stained with yellow-brown iron oxide. Some green chlorite mineralization on joint surfaces. Intensely jointed, core recovered in gravel sized fragments to 0.5' lengths. Three predominant joint sets: 1.) horizontal, spaced at 1.0-3.0' intervals; 2.) dips 15-25°, spaced at 1" to 0.5' intervals; 3.) dips 30-40° opposite set 2, spaced at 2" to 4.0' intervals. Two joints dip 75°.	
	210	100	Bentonite									
	220	100	Cement Plug				878.7	210				
	5 7/8"	100										
	220	100	Sand					220				
	NxD	100	Piezometer #1					230				
	230	100										
	240	100						240				
	250	100					839.7	249.5				
			REACHED REQUIRED DEPTH									
	260							260				
	270							270				
	280							280				
	290							290				

			EXPLANATION			
CORE LOSS	w/ = With	CS = Casing				
	@ = At	PC = Churn drill				
CORE RECOVERY	BS = Bailer sample	H = Core drilled w/ Haystellite bit				
	WS = Wash sample	D = Core drilled w/ Diamond bit				
Type of hole... D = Diamond, H = Haystellite, S = Shot, C = Churn						
Hole sealed... P = Packer, Cm = Cemented, Cs = Bottom of casing						
Approx. size of hole (X-series)... Ex = 1-1/2", Ax = 1-7/8", Bx = 2-3/8", Nx = 3"						
Approx. size of core (X-series)... Ex = 7/8", Ax = 1-1/8", Bx = 1-5/8", Nx = 2-1/8"						
Outside dia. of casing (X-series)... Ex = 1-13/16", Ax = 2-1/4", Bx = 2-7/8", Nx = 3-1/2"						
Inside dia. of casing (X-series)... Ex = 1-1/2", Ax = 1-29/32", Bx = 2-3/8", Nx = 3"						

FEATURE... THIRD POWERPLANT EXTENSION... PROJECT... GRAND COULEE... STATE... WASHINGTON... SHEET... 3 OF... 3... HOLE NO. DH-425

APPENDIX III

EPA LETTER



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

Washington Operations Office
c/o Washington Department of Ecology
P.O.B. 47600
Olympia, Washington 98504-7600

April 15, 1993

Jim Ray
Ray-Tozzer Partnership
720 E. Washington, Suite 112
Sequim, Washington 98382

Dear Mr. Ray:

This letter is a followup to your submittal of soil pile sampling results for your Coulee Express Leaking Underground Storage Tank (LUST) site. Having reviewed your sampling data the Environmental Protection Agency (EPA) concurs with your decision that, based on the data submitted, the excavated soils can be returned to the excavation pit.

For further remediation, please send a more formal proposal for review, based on your monitoring well sampling data, that will address how you specifically plan to address the remaining contamination. EPA will need to review this corrective action plan prior to any approval for final cleanup.

If you have any further questions, please feel free to contact me at (206) 753-9543.

Sincerely,

A handwritten signature in cursive script, appearing to read "Robert B. Cutler", is written above the typed name.

Robert B. Cutler
UST Program Coordinator
Washington Operations Office

cc: Harold Scott, WD-133
Mayor Rod Hartman, City of Coulee Dam

APPENDIX IV

WELL LOGS

DIVISION LOG		DIVISION		INSTALLATION		Hole No. <i>MW-1</i>	
1. PROJECT		2. LOCATION (Coordinates or Station)		3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER		6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE		10. SIZE AND TYPE OF BIT		11. DAYUM FOR ELEVATION SHOWN (TBM or BML)		12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE STARTED	
17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR		20. DATE HOLE COMPLETED	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
	1	GP	- sandy gravel - to - gravelly sandy with cobbles			- hit concrete slab ~ 6" below the surface - first 20' is material that was removed at the time the tanks were pulled and has been not put back in the pit	
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						

PROJECT

Coulee Mini Mart

INSTALLATION

SHEET
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20	Clay	Clay with basalt + other cobble sized material several gas ocks hit a boulder			PI D read 175 ppm
	21		continuous cobbles			
	22					

DRILLING (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. MW-1		
PROJECT		INSTALLATION		SHEET 3 OF 5 SHEETS		
PROJECT		INSTALLATION		SHEET 3 OF 5 SHEETS		
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	22	GP	sand, gravel & cobbles		*	PI D reading 12.8 ppm * sample IAD-COMW1-22865
	23					
	24					
	25	GP	sand, gravel & cobbles		*	PI D reading 13.1 ppm * sample IAD-COMW1-25865
	26					
	27					
	28					
	29					
	30	GP	sand, gravel & cobbles		*	PI D reading 30.9 ppm * sample IAD-COMW1-30865
	31					
	32					
	33					
	34					

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No. MW 1

PROJECT

Coulee Dam Mini Mart

INSTALLATION

SHEET 4
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	35	GP	sand, gravel + cobbles		*	PID reading 129 ppm * sample IAO-CDMW1-35BGS
	36					
	37					
	38					
	39					
	40	GP	sand, gravel + cobbles		*	PID reading 42.8 ppm * sample IAO-CDMW1-40BGS
	41					
	42					
	43					
	44					
	45	GP	sand, gravel + cobbles		*	PID reading 94.6 ppm sample IAO-CDMW1-45BGS
	46					

ENG FORM
JUN 67

1836-A

(SR 1110-1-1801)

GPO 1980 OF - 678-603

PROJECT

HOLE NO.

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No. MW-1

PROJECT

Coulee Dam Mini Mart

INSTALLATION

SHEET

OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	47					
	46					
	44					
	50	GP	sand, gravel & cobbles		*	PID reading 0.0 ppm *sample I 10°C DMW1-50865

ENG FORM 1836-A

(ER 1110-1-1801)

GPO 1980 OF - 528 - 503

PROJECT

HOLE NO.

DIVISION		INSTALLATION		Hole No. MW-2	
1. PROJECT		10. SIZE AND TYPE OF BIT		SHEET 1	
Coulee Dam Min. Mart		Tri-cone		OF 3 SHEETS	
2. LOCATION (Coordinates or Station)		11. DAYUM FOR ELEVATION SHOWN (TBM or BM)			
3. DRILLING AGENCY		12. MANUFACTURER'S DESIGNATION OF DRILL			
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED UNDISTURBED	
5. NAME OF DRILLER		14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE		15. ELEVATION GROUND WATER			
<input type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		16. DATE HOLE		STARTED 9 April 93 COMPLETED 9 April 93	
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE			
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING		%	
9. TOTAL DEPTH OF HOLE		19. SIGNATURE OF INSPECTOR			

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1					- first six inches was asphalt
	2					
	3					
	4					
	5		sand + gravel		x	PID reading 0.0ppm sample IAO-CDMW2-5BGS
	6					
	7					
	8					
	9					
	10		sand + gravel + pebbles		x	PID reading 0.0ppm sample IAO-CDMW2-10BGS

ENG FORM 1836
MAR 71

PREVIOUS EDITIONS ARE OBSOLETE.
(TRANSLUCENT)

PROJECT

HOLE NO.

DRILLING (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. MW-2		
PROJECT		INSTALLATION		SHEET 2 OF 3 SHEETS		
ELEVATION a	DEPTH b	LOGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10					
	11					
	12					
	13					
	14					
	15	GP	sands, gravel & cobbles		*	PID reading 0.0 ppm *sample IAG-CDMW2-15BGS
	16					
	17					
	18					
	19					
	20	GP	sands, gravel & cobbles		*	PID reading 0.0 ppm *sample IAG-CDMW2-20BGS
	21					
	22					

DRILLING (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. MW-2		
PROJECT		INSTALLATION		SHEET 3 OF 3 SHEETS		
PROJECT		INSTALLATION		SHEET 3 OF 3 SHEETS		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
a	b	c	d	e	f	g
	22					
	23					
	24					
	25	GP	sands, gravels, cobbles		*	PID reading 0.0ppm * sample IAO-C DMW2-25BGS
	26					
	27					
	28					
	29					
	30	GP	sands, gravels & cobbles		*	PID reading 0.0ppm * sample IAO-C DMW2-30BGS -stopped drilling at 30 ft BGS as there was no indication of contamination. Abandoned well according to WA DOE regulations. Filled hole to surface w/ bentonite.

DRILLING LOG		DIVISION		INSTALLATION		Hole No. MW 3	
1. PROJECT		2. LOCATION (Coordinates or Station)		3. DRILLING AGENCY		4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER		6. DIRECTION OF HOLE		7. THICKNESS OF OVERBURDEN		8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE		10. SIZE AND TYPE OF BIT		11. DATUM FOR ELEVATION SHOWN (TBM or BM)		12. MANUFACTURER'S DESIGNATION OF DRILL	
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		14. TOTAL NUMBER CORE BOXES		15. ELEVATION GROUND WATER		16. DATE HOLE	
17. ELEVATION TOP OF HOLE		18. TOTAL CORE RECOVERY FOR BORING		19. SIGNATURE OF INSPECTOR		20. REMARKS	
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
	1						
	2						
	3						
	4						
	5		sand & gravel			* PID reading 0.0 ppm sample LAO-CDMW3-5 BGS	
	6						
	7						
	8						
	9						
	10						

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No. MW-3

PROJECT

Coulee Dam Mini Mart

INSTALLATION

SHEET 2
OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	10		sand, gravel		8	PI D reading 0.0 ppm * sample IAO-CDMW3-10 BGS
	11					
	12					
	13					
	14					
	15		sand, gravel + few cobbles		9	PI D reading 0.0 ppm * sample IAO-CDMW3-15 BGS
	16					
	17					
	18					
	19					
	20	GP	sand, gravel + cobbles		10	PI D reading 0.0 ppm * sample IAO-CDMW3-20 BGS
	21					
	22					

ENG FORM
JUN 67

1836-A

(ER 1110-1-1801)

GPO 1980 OF - 628-603

PROJECT

HOLE NO.

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No. MW-3

PROJECT

Coulee Dam Mini Mart

INSTALLATION

SHEET 3 OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	22					
	23					
	24					
	25	GP	gravel, sand + cobbles		#	PI D reading 0.0 ppm + sample IAO-CDMW3-25BG5
	26					
	27					
	28					
	29					
	30	GP	gravel, sand + cobbles		#	PI D reading 0.0 ppm + sample IAO-CDMW3-30BG5
	31		- fine sand clay mixture			
	32					
	33		gravel, sand + cobbles			
	34					

ENG FORM
JAN 67

1836-A

(ER 1110-1-1801)

GPO 1980 OF - 628 - 603

PROJECT

HOLE NO.

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. MW-3		
PROJECT		INSTALLATION		SHEET 4 OF 5 SHEETS		
Poultice Dam Mini Mart						
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
34						
35	6P		sand, gravel & cobbles		*	PID reading 0.0 ppm sample IAG-CDMW3-35BGS
36						
37						
38						
39						
40	6P		sand, gravel & cobbles		*	PID reading 0.0 ppm sample IAG-CDMW3-40BGS
41						
42			- well sorted sand, orange in color			
43						
44						
45			- well sorted sand, orange in color		*	PID reading 0.0 ppm sample IAG-CDMW3-45BGS
46						

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE

Hole No. MW-3

PROJECT

Coulee Dam Mini Moist

INSTALLATION

SHEET 5

OF 5 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	46					
	47					
	48					
	49					
	50		well sorted sand orange in color		*	PI D reading 0.6 ppm * sample IAC CDMW3-50/365

ENG FORM
JUN 67

1836-A

(SR 1110-1-1801)

GPO 1980 OF - 528 - 503

PROJECT

HOLE NO.

APPENDIX V

LABORATORY RESULTS

Anatek Labs

1917 S. Main Moscow, ID 83843

(208) 883-BTEX (2839)

FAX: (208) 882-9246

April 15, 1993

Blue Ridge Associates, Inc.

N. 9 Post, Suite # 250

Spokane, WA 99201

Attn: Iain Olness

Items: Results of analysis for samples received 4/13/93. Sample Log-in number is 792.

Project: Coulee Dam Mini-Mart

Date Sampled: 4/7/93 & 4/9/93

Report # 93-0415-BRA Page 1 of 3

Gasoline by WA-TPH-G (EPA 8015 Modified)

BTEX by EPA 8020

Total Lead by EPA 7420 mg/Kg = ppm

Sample Name	Matrix	Analysis Date	Analyte	Concentration
IAO-CDMW1-22BGS	Soil	4/14/93	Gasoline	321 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.294 mg/Kg
			Xylene	0.246 mg/Kg
			Lead	16.2 mg/Kg
IAO-CDMW1-25BGS	Soil	4/14/93	Gasoline	378 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.156 mg/Kg
			Xylene	0.149 mg/Kg
			Lead	9.9 mg/Kg
IAO-CDMW1-30BGS	Soil	4/14/93	Gasoline	114 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.011 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	6.4 mg/Kg

Anatek Labs

1917 S. Main Moscow, ID 83843

(208) 883-BTEX (2839)

FAX: (208) 882-9246

93-0415-BRA Page 2

Sample Name	Matrix	Analysis Date	Analyte	Concentration
IAO-CDMW1-35BGS	Soil	4/14/93	Gasoline	76 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.048 mg/Kg
			Xylene	0.026 mg/Kg
			Lead	2.1 mg/Kg
IAO-CDMW1-40BGS	Soil	4/14/93	Gasoline	9.3 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.007 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	2.0 mg/Kg
IAO-CDMW1-45BGS	Soil	4/14/93	Gasoline	6.7 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.009 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	4.0 mg/Kg
IAO-CDMW1-50BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.007 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	10.9 mg/Kg
IAO-CDMW2-5BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.010 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	2.8 mg/Kg
IAO-CDMW2-10BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.006 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	6.4 mg/Kg



**Anatek
Labs**

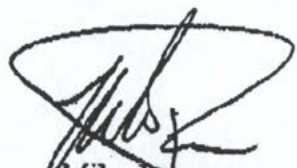
1917 S. Main Moscow, ID 83843

(208) 883-BTEX (2839)

FAX: (208) 882-9246

93-0415-BRA Page 3

<i>Sample Name</i>	<i>Matrix</i>	<i>Analysis Date</i>	<i>Analyte</i>	<i>Concentration</i>
IAO-CDMW2-15BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.006 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	1.1 mg/Kg
IAO-CDMW2-20BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.066 mg/Kg
			Xylene	0.038 mg/Kg
			Lead	2.2 mg/Kg
IAO-CDMW2-25BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	5.1 mg/Kg
IAO-CDMW2-30BGS	Soil	4/14/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	5.6 mg/Kg

Mike Pearson
Laboratory Director

April 19, 1993

Blue Ridge Associates, Inc.

N. 9 Post, Suite # 250

Spokane, WA 99201

Attn: Iain Olness

Items: Results of analysis for samples received 4/14/93. Sample Log-in number is 801.

Project: Coulee Dam Mini-Mart

Date Sampled: 4/12/93

Report # 93-0419-BRA Page 1 of 2

Gasoline by WA-TPH-G (EPA 8015 Modified)

BTEX by EPA 8020

Total Lead by EPA 7420; mg/Kg = ppm

<i>Sample Name</i>	<i>Matrix</i>	<i>Analysis Date</i>	<i>Analyte</i>	<i>Concentration</i>
IAO-CDMW3-5BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	1.6 mg/Kg
IAO-CDMW3-10BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	5.0 mg/Kg
IAO-CDMW3-15BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	1.4 mg/Kg
IAO-CDMW3-20BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	2.3 mg/Kg



93-0419-BRA Page 2

Sample Name	Matrix	Analysis Date	Analyte	Concentration
IAO-CDMW3-25BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	7.8 mg/Kg
IAO-CDMW3-30BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	2.3 mg/Kg
IAO-CDMW3-35BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	4.5 mg/Kg
IAO-CDMW3-40BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	3.3 mg/Kg
IAO-CDMW3-45BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	9.4 mg/Kg
IAO-CDMW3-50BGS	Soil	4/16/93	Gasoline	< 1.0 mg/Kg
			Benzene	< 0.001 mg/Kg
			Toluene	< 0.005 mg/Kg
			Ethylbenzene	< 0.005 mg/Kg
			Xylene	< 0.015 mg/Kg
			Lead	5.7 mg/Kg



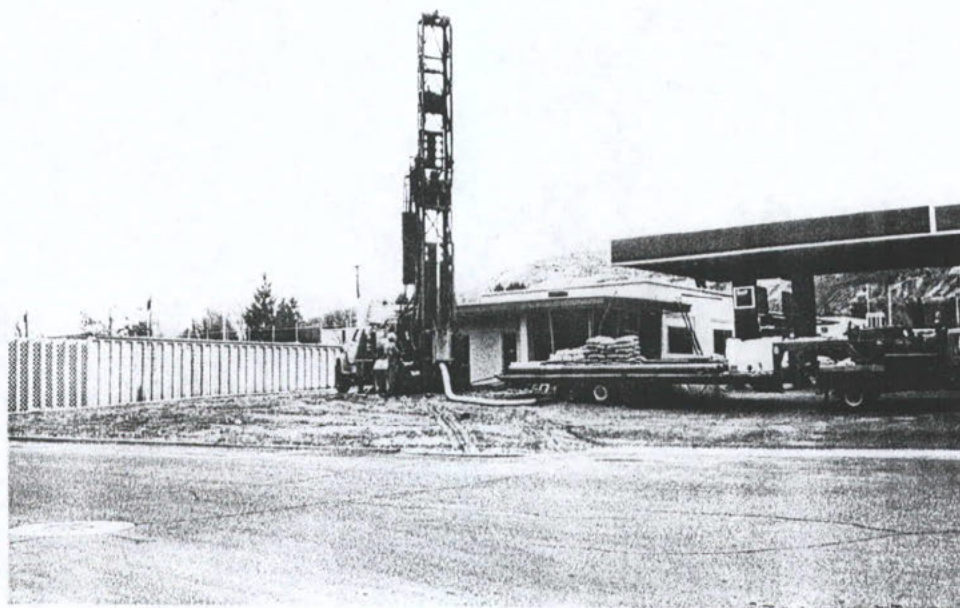
Mike Pearson
Laboratory Director



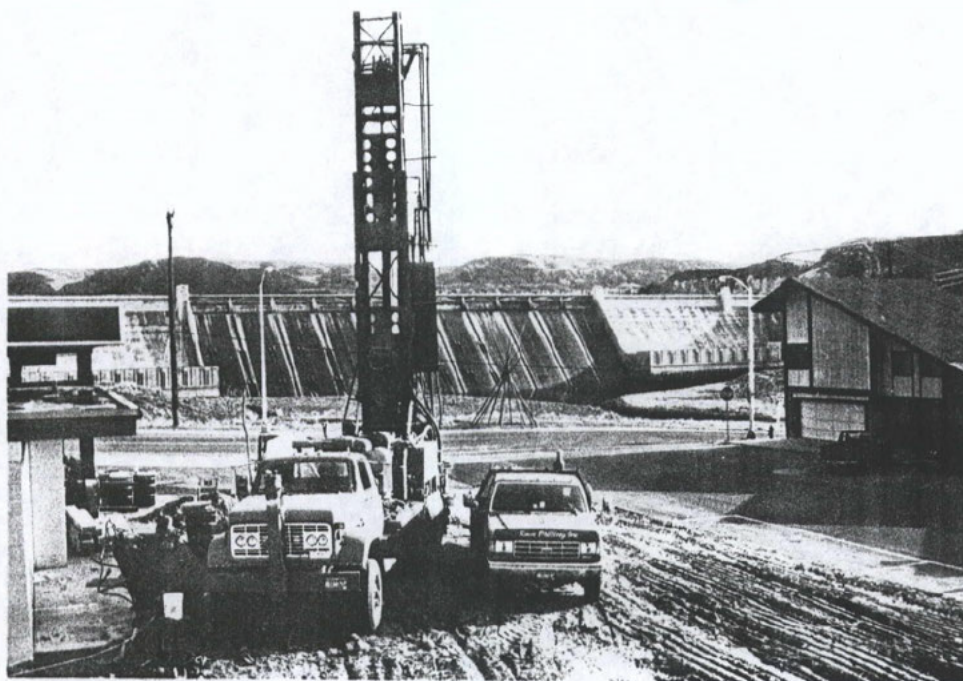
PHOTOGRAPHS

PHOTOGRAPHS

- | | |
|-----------------------|--|
| Photograph 1. | Drilling Hole Number - One, looking east-northeast. |
| Photograph 2. | Drilling Hole Number - One, looking south-southwest. |
| Photograph 3. | Drilling Hole Number - One, looking north. |
| Photograph 4. | Drilling Hole Number - One, looking north-northeast. |
| Photograph 5. | Drilling Hole Number - Two, looking east. |
| Photograph 6. | Drilling Hole Number - Two, looking north. |
| Photograph 7. | Drilling Hole Number - Two, looking north-northwest. |
| Photograph 8. | Drilling Hole Number - Two, looking south. |
| Photograph 9. | Drilling Hole Number - Three, looking east-northeast. |
| Photograph 10. | Drilling Hole Number - Three, looking east. |
| Photograph 11. | Drilling Hole Number - Three, looking north-northwest. |
| Photograph 12. | Drilling Hole Number - Three, looking northeast. |



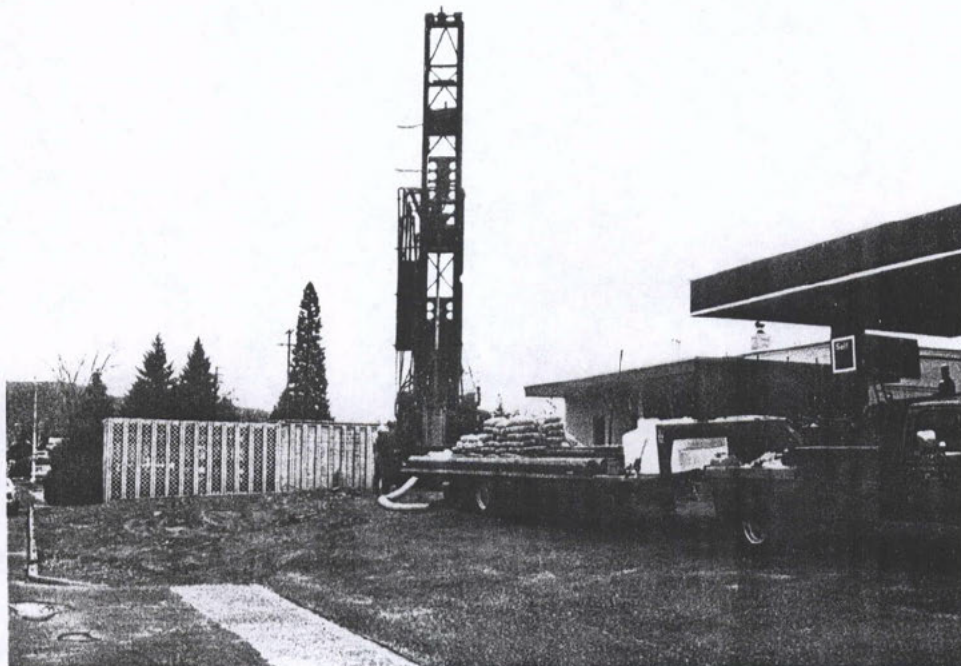
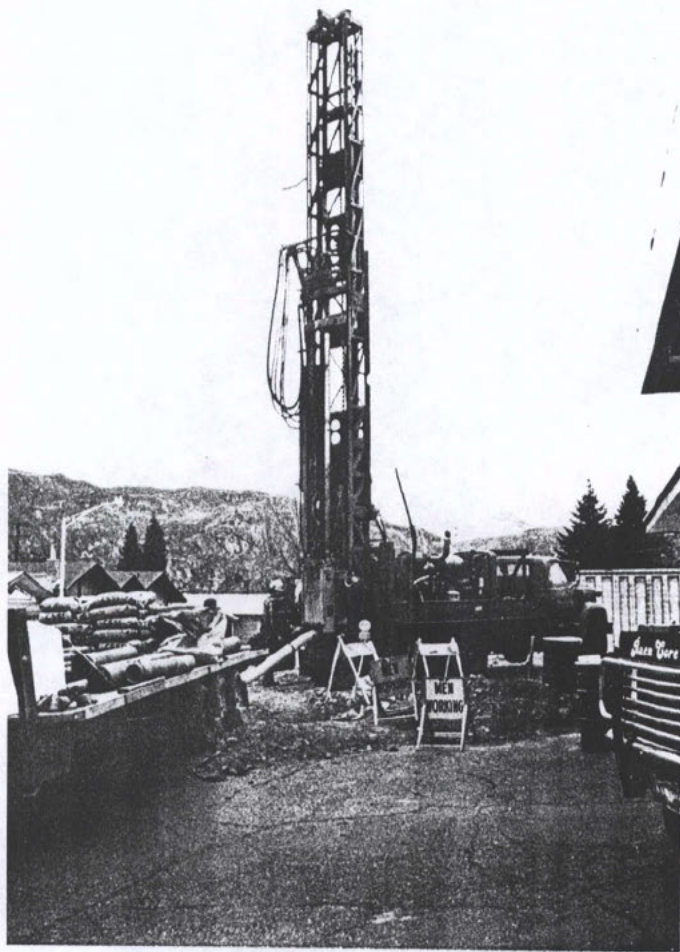
Photograph 1. Drilling Hole Number - One, looking east-northeast.



Photograph 2. Drilling Hole Number - One, looking south-southwest.

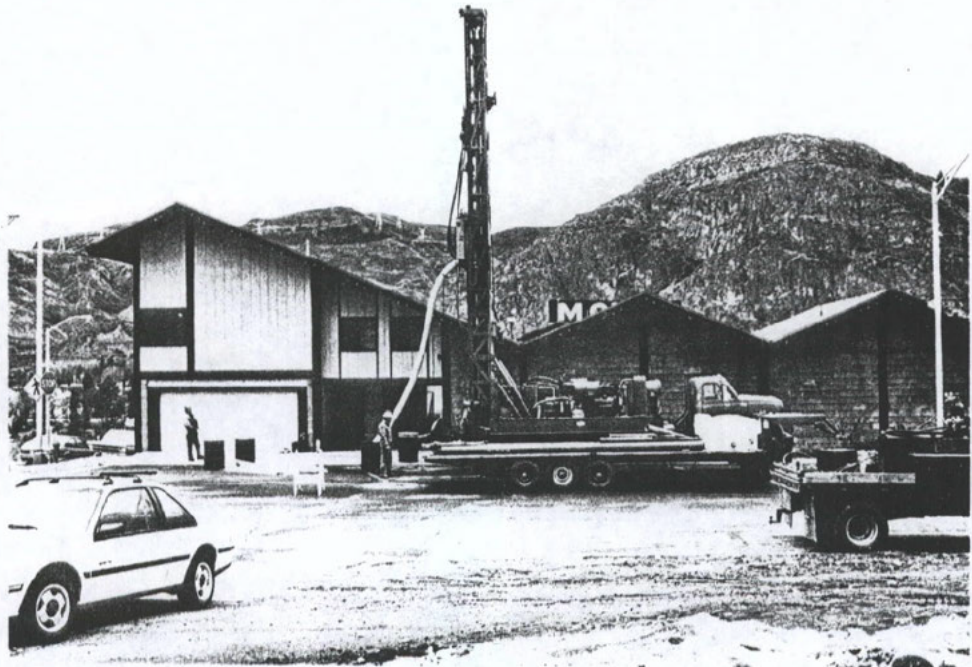
Photograph 3.

Drilling Hole Number
- One, looking north.

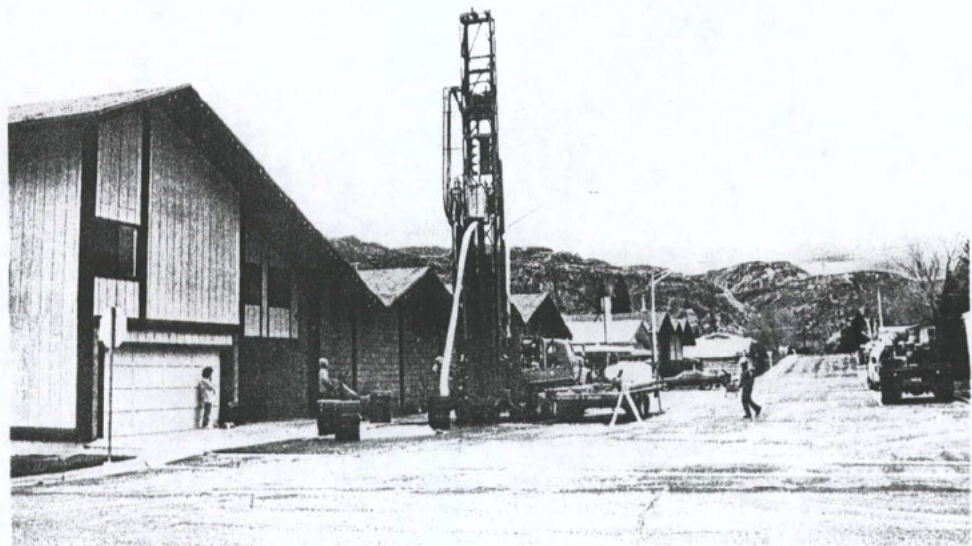


Photograph 4.

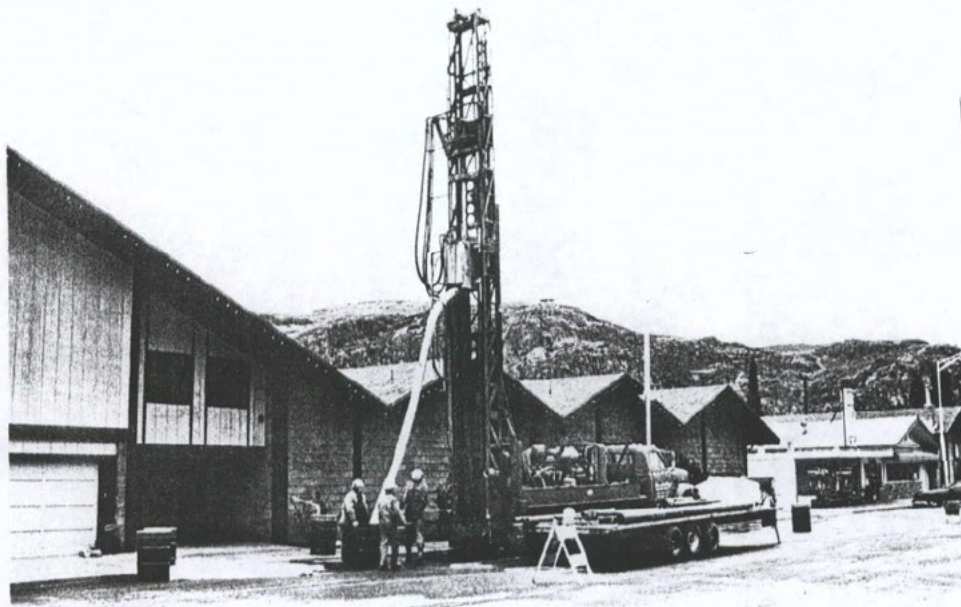
Drilling Hole Number - One, looking north-northeast.



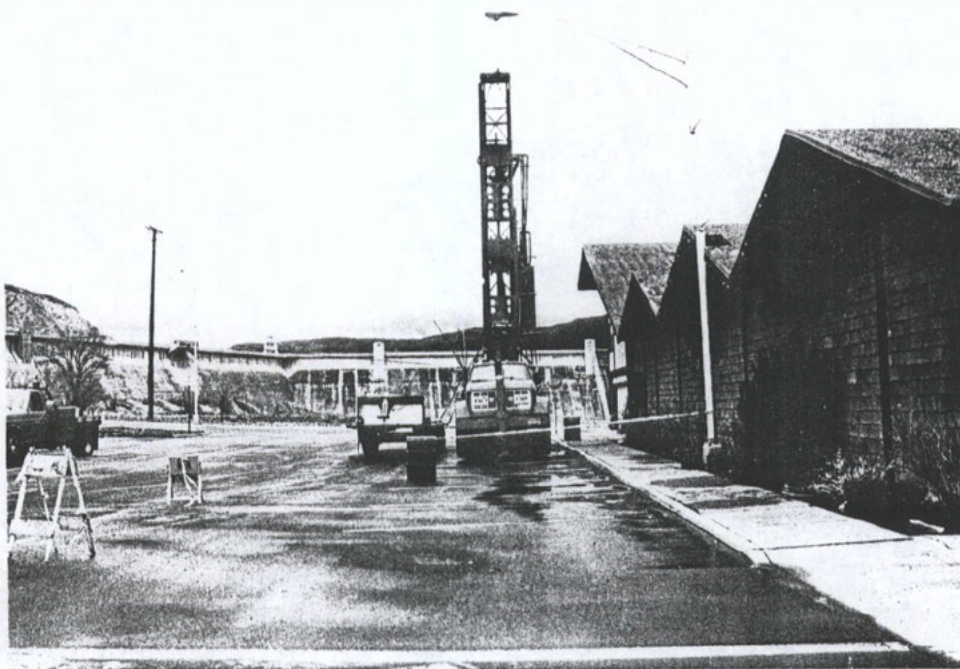
Photograph 5. Drilling Hole Number - Two, looking east.



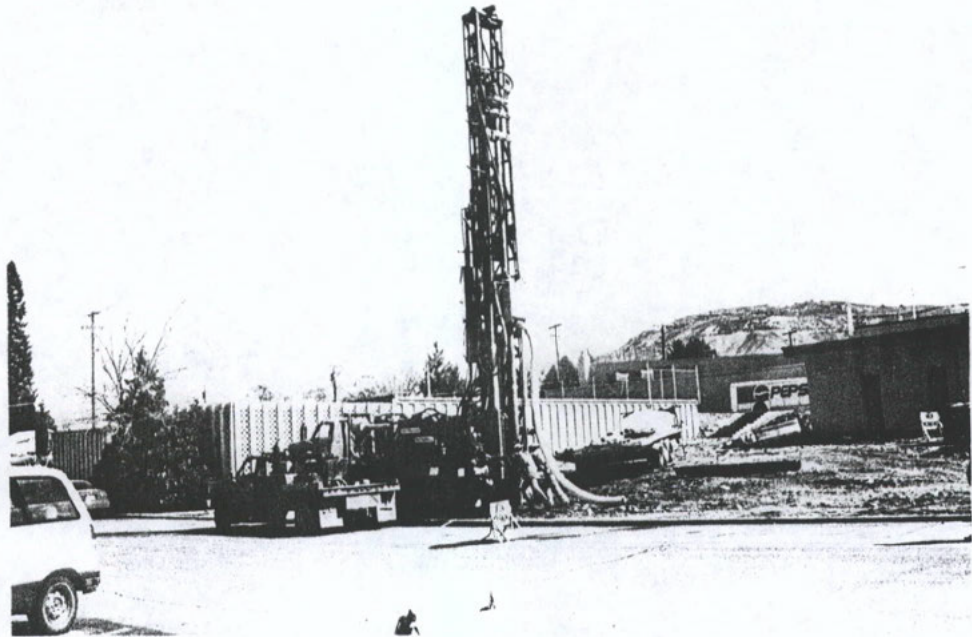
Photograph 6. Drilling Hole Number - Two, looking north.



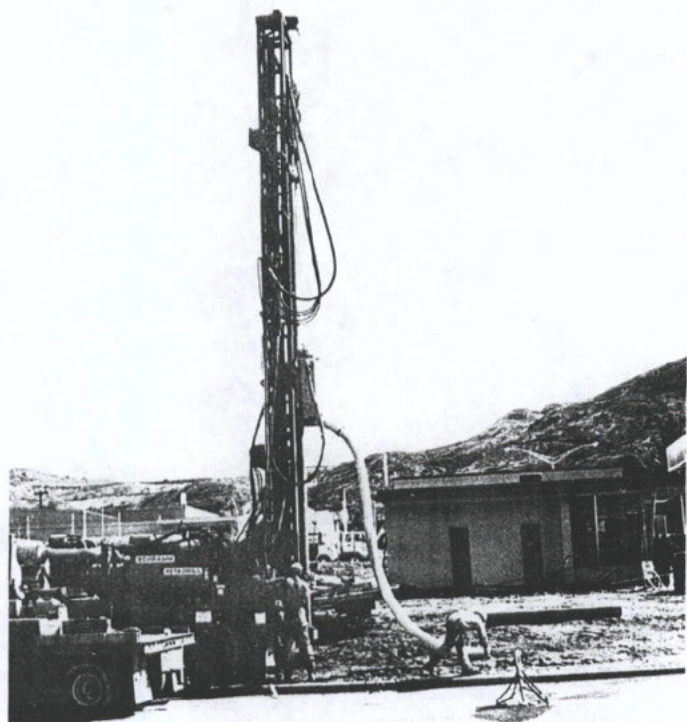
Photograph 7. Drilling Hole Number - Two, looking north-northwest.



Photograph 8. Drilling Hole Number - Two, looking south.



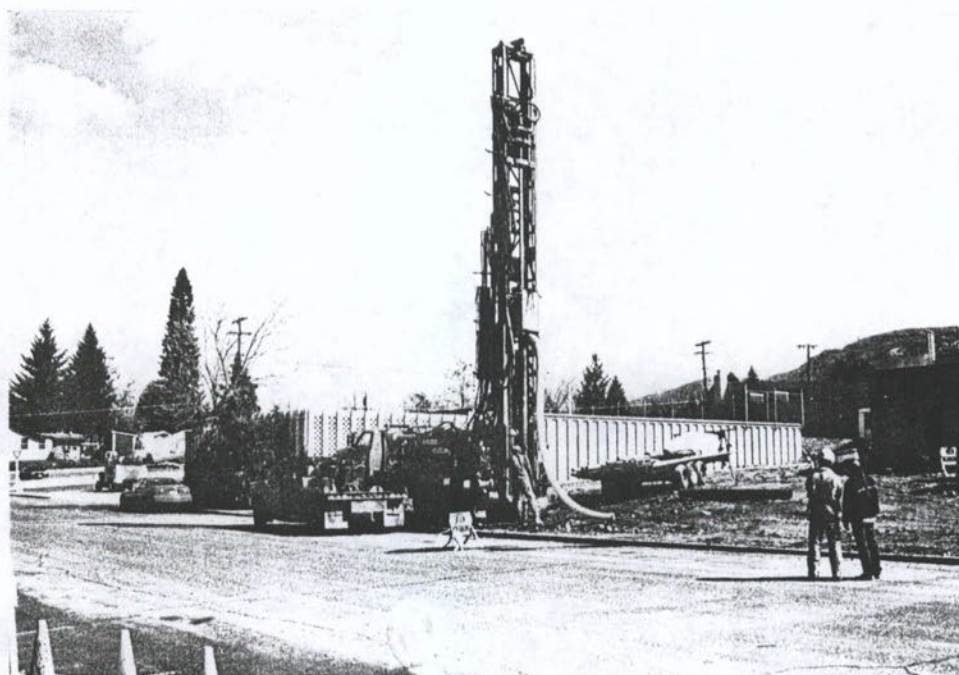
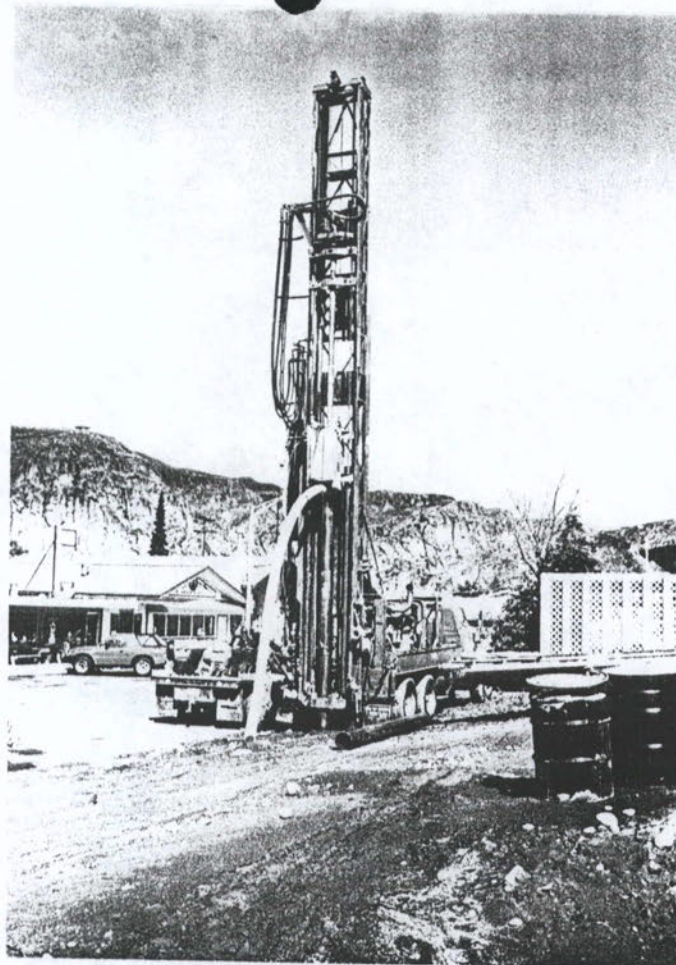
Photograph 9. Drilling Hole Number - Three, looking east-northeast.



Photograph 10. Drilling Hole Number - Three, looking east.

Photograph 11.

Drilling Hole Number
- Three, looking
north-northwest.



Photograph 12.

Drilling Hole Number - Three, looking northeast.